

What is claimed is:

- 1 1. In a cam torque actuated (CTA) system having a crank shaft coupled to at least one cam  
2 shaft, at least one timing gear associated with the crank shaft or a cam shaft, the  
3 timing gear comprising:  
4 at least two groups of toothlike projections including a first group having a first  
5 distance to the center of the wheel, and a second group having a second distance to  
6 the center of the wheel, the first distance being different from the second distance;  
7 whereby torsional energy for torque actuated purposes is increased for the  
8 CTA system.
- 1 2. The timing gear of claim 1, wherein the at least two groups further comprising a third  
2 group having a third unique distance to the center of the wheel.
- 1 3. The timing gear of claim 1, wherein the timing gear is concentrically coupled to the at  
2 least one cam shaft.
- 1 4. The timing gear of claim 1, wherein the timing gear is concentrically coupled to a crank  
2 shaft.
- 1 5. The timing gear of claim 1, wherein the timing gear is mounted upon a phaser.
- 1 6. The timing gear of claim 1, wherein the timing gear is engaging an engine timing chain,  
2 said timing gear having various toothlike projections and grooves arranged on a  
3 wheel rim of a wheel for engaging the links of a timing chain.
- 1 7. The timing gear of claim 1, wherein the timing gear is engaging an engine timing belt.
- 1 8. In a cam torque actuated (CTA) system having a crank shaft coupled to at least one  
2 cam shaft, the system comprising:  
3 a resonator positioned upon the at least one cam shaft, the resonator including at  
4 least one mass and at least one elastic element;

5           whereby torsional oscillation of the at least one cam shaft at a predetermined  
6           engine speed range is increased.

1       9. The system of claim 8, wherein the at least one mass comprising an annular metal  
2       member.

1       10. The system of claim 8, wherein the at least one elastic element comprising annular  
2       rubber member attached onto the at least one cam shaft.

3       11. The system of claim 8, wherein the at least one elastic element comprising at least one  
4       spring having a first end attached to the at least one cam shaft and a second end  
5       connected to the at least one mass.